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BIRD

INSTRUCTION book

MODEL 8890-300

MP MASTER
MA34307

INSTRUCTION MANUAL
for
Series 8890-300 TERMALINE®
-
Coaxial Load Resistors

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Series 8890-300 TERMALINE®

RF Load Resistors

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SUMMARY SPECIFICATIONS

Power Rating	2500 watts continuous duty
RF Input Impedance	50 Ohms - All Models
Input Connectors (Per Model Type)	8890-300 Bird "QC" Type (Female LC normally supplied) 8891-300 3-1/8 EIA Flanged 8892-300 1-5/8 EIA Flanged 8895-300 1-5/8 Unflanged 8897-300 3-1/8 Unflanged (Flush center conductor)
Frequency Range	DC to 2.5 GHz
VSWR - All Models	1.10 to 1.0 - DC to 1 GHz 1.25 to 1.0 - 1 to 2 GHz 1.30 to 1.0 - 2 to 2.4 GHz
Ambient Temperature	-40°C to +45°C
Dimensions	17-3/16" h x 7-1/8" w x 21-45/64" lg. (437 x 181 x 551 mm)
Weight	54 lbs. 10 oz. (24.78 Kg)
Finish	Light Navy Gray (MIL-E-15090B)

Bird Electronic Corp.
Cleveland (Solon), Ohio

8890-300 Series RF Load Resistors

SECTION I - General Description

The Model 8890-300 Series TERMALINE® Dummy Load is designed as a low reflection and non-radiating termination for coaxial transmission lines, to aid in the tuning and trouble-shooting of transmission equipment within its rating. The specifications pertaining to the Model 8890-300 Series are given on the Summary Sheet, Page "A". Also included are listings of the RF input connector types for individual models.

The 8890-300 Series is fully self-contained. No additional equipment or outside power source is required.

Attached to the front and rear panels of the rhombic-shaped radiator are mounting flanges. These flanges act as supports for free standing use in portable applications, or as mounting brackets for optional fixed installation. There are mounting slots provided in the flanges for this purpose, see Installation, Section III. Convenient carrying tabs are also provided at each end of the radiator.

The RF input connection is on the lower front face of the unit. The respective models are designed for use with 3-1/8" or 1-5/8" rigid lines, or for cable types using large (LC or LT) connectors. Connection arrangements are described in Operation Section; Bird Quick-Change "QC" connectors (with their method of change) are described in Section V, Maintenance. The Load unit is filled with a specially selected dielectric coolant. At the upper end of the Dummy Load fin structure is a vent plug which relieves internal pressure resulting from expansion of heated coolant. Vent plug is installed before operating the Load.

SECTION II - THEORY OF OPERATION

The Model 8890-300 Series equipment consists essentially of a carbon-film-on-ceramic resistor immersed in a dielectric coolant. The resistor, which is individually selected for its accuracy is enclosed in an exponentially tapered housing, providing a reduction in surge impedance directly proportional to the distance along the resistor. When the resistor unit is immersed in the dielectric liquid, the characteristic impedance will be 50.0 ohms at the connector end and graduate down from there to zero ohms at the rear, where the resistor joins the housing forming the return conductor of the coaxial circuit. This produces a uniform, practically reflectionless line termination over the stated frequencies of the load resistor.

The dielectric coolant, a low volatility, high-flash point snythetic oil, is chosen for its desirable thermal characteristics and dielectric properties, to which the diameters of the resistor housing are matched. A synthetic rubber O-ring around the outside of the resistor housing mount furnishes a seal for the radiator opening. A beveled flange retains the O-ring. The O-ring is pressed against the radiator face by the action of drawing up of radial V-band clamp around the enclosing beveled flanges.

When input power is applied, the resistor generates heat in the adjacent dielectric coolant. By convection, the heated oil flows through holes in the coaxial shell to the walls of the radiator tank. This radiator is a fabricated single-unit construction, and is carefully designed of heat-sink sections on a unique vertical rhombic form. This provides a very high efficiency of heat transfer from the dielectric coolant into the surrounding air.

SECTION III - INSTALLATION

The Model 8890-300 Series Dummy Load is equipped for either fixed installations or portable use. There are mounting brackets on the front and rear faces of the unit. The Load may stand free or be attached to a bench, etc., by means of four suitable fasteners. Four 3/8" (9.525 mm) mounting slots, to be used with appropriate screws sets up to 3/8" diameter, are arranged in a 4-1/2" x 20-23/32 rectangle. (114.3 x 526.3 mm).

This equipment is designed for operation in a horizontal position only, with mounting brackets down. NOTE: DO NOT OPERATE IN ANY OTHER MANNER.

CAUTION

Before placing the unit into operation, remove the shipping plug at the top of radiator, near front, and substitute with the specially shielded breather plug. Use a 3/4" flat wrench for this purpose - do not lose the O-ring seal.

This vent hole must remain open at all times when the unit is in operation or cooling. Failure to do this could result in damage to the equipment and endanger the operator's safety. The use of the vent plug also protects the filler opening against intrusion of foreign material while allowing unobstructed venting of the tank. The shipping plug (with O-ring seal) should be replaced whenever the unit is to be transported. Be sure to check this plug.

As an optional item, the Dummy Load may be provided with a Thermoswitch Assy., (Bird P/N 8890-008). When installed on the back of the radiator, opposite end to the RF input, it will prevent possible damage occurring from accidental transmitter power overload or equipment malfunction. Being normally closed, the thermoswitch opens at a maximum safe temperature. Connected in series with the transmitter interlock, it cuts off transmitter power if load temperature exceeds this value. The assembly consists of Thermoswitch Body (P/N 8890-005) with Coupling Jack (P/N 2450-018) attached.

Connect the thermoswitch, proceeding as follows:-

a. Unscrew the larger knurled ring-nut at the lower end of the Coupling Jack Assy. and pull off from the Thermoswitch Jack. Unscrew small knurled cover fitting from base plug of the connector to release the base.

b. Thread interlock wires thru the clamp (with washers inside) and with its threaded fitting in place. Service the interlock wire with short tips, use spaghetti sleeves over wire ends if needed, then securely solder the interlock leads to lugs of the connector base. Note:- Be sure that the larger captive clamping nut is in place over the base plug with the knurled end outward (towards face).

c. Screw on cover ring first, then fasten the cable clamp in place, and tighten the two yoke screws on cable. Push plug back on Thermoswitch, and tighten captive knurled connecting ring. Do not attempt to operate the equipment without interlock attached.

SECTION IV - OPERATION

1. Load Resistor Connection

a. The Load is ready for connection as received from the factory. It may be useful to check 50-ohm input resistance of Load (before attachment), see Maintenance, Section V. Be sure vent plug is installed.

b. Clean all conductors and insulator surfaces on transmission line face and check RF input connector. Use Inhibisol* or trichloroethylene on a cotton swab stick, if necessary.

c. Attach the respective Load Resistor models to the RF line as follows:- (Note that the -300 subscript applies to all model nos.)

Model 8890 - Use 50-ohm coaxial cable such as RG-218/U or -220/U (-17A or 19A) with suitable LC or LT plug attached.

For respective rigid-line Models use connector kits as listed:-

Model 8891 - 3-1/8" EIA Flanged, 50 ohms.

3-1/8" EIA Coupling Kit (Bird P/N 4600-020) which includes (6) 3/8-16 x 1-1/2 bolt sets, O-ring, and Anchor Bullet (center conductor).

Model 8892 - 1-5/8" EIA Flanged, 50 ohms.

1-5/8" EIA Coupling Kit (Bird P/N 4712-020) which includes (4) 5/16-18 x 1-1/2 bolt sets, O-ring, and Anchor Bullet.

Model 8895 - 1-5/8" Unflanged, 50.0 ohms, flush center conductor. Use Bird Coupling Kit #5-812 (RCA MI-561565-4A) consisting of Outer Sleeve (1-5/8") with two clamping bands and the center conductor Coupling Bullet.

*Non-toxic, non-flammable dry cleaning agent, manufactured by Penetone Co., Tenafly, N.J.

Model 8897 - 3-1/8" Unflanged 50.0 ohms, flush center conductor. Use Bird Coupling Kit #5-726 (RCA MI-27791K-4A) consisting of Outer Sleeve with two clamping bands and the center conductor Coupling Bullet.

Make sure all connections are properly tightened. Avoid unnecessary use of adapters and elbows as much as possible.

2. Load Resistor Operation

Proceed according to the instructions pertaining to the specific transmitting equipment.

Due to the difference in VSWR between the Dummy Load and the transmitter's antenna, re-adjustment of the transmitter may be required when returning to the original antenna.

SECTION V - MAINTENANCE

1. General

The Model 8890-300 Series TERMALINE is very rugged and simple. It should require only nominal routine attention. The Load will operate for long periods of time if its power handling capabilities are not exceeded.

The outside surface of the instrument should be wiped free of dust and dirt when necessary. Clean the RF input connector with Inhibisol, tetrachloroethylene, or its equivalent, on a cotton swab stick. Take special care to clean the metallic contact surface and the exposed faces of the teflon insulator.

CAUTION

Provide adequate ventilation and observe normal precautions when using dry cleaning solvents.

2. Load Resistor

Accurate DC measurement of the input resistance will provide a good check of the condition of the load resistor. For this measurement, a Resistance Bridge (such as Leeds and Northrup Model 5305 Test Set) with an accuracy of one percent or better at 50 ohms should be used. Use low resistance leads, preferably a short piece of 50-ohm cable with clips which can attach to the input connector of the Dummy Load. When the resistor is checked at room temperature, the measured resistance should be within a range of 49.0 to 52.5-ohms. If the value materially exceeds this allowance, the load resistor may need replacement. Also, the measured resistance should not deviate more than one ohm from the value stamped on the white tag attached to the load.

To change the load resistor assembly, place the unit on its back end (connector up) and loosen the #10-32 x 1-1/2" screw on the clamping band. When lifting the radiator front, be careful its top side always faces up. The vent hole at the radiator top is so placed that, when the equipment is up-ended at the front, the coolant level will be just below the vent hole and will not spill. Remove the clamping band, and lift load resistor assembly out of the tank - allow coolant to drip back into the tank. This unit is not subject to further disassembly by field maintenance, and a defective unit should be replaced in its entirety. Before replacing a load resistor, be sure that the O-ring seal is in good condition. It should be free of twists and positioned evenly all around the beveled flange of the resistor housing.

To replace housing assembly, reverse procedure described in paragraph above.

3. Coolant

The level of the dielectric coolant should remain constant in the unit after prolonged usage under normal operating conditions. Inspect occasionally around lower portion of the clamping band, for possible coolant leakage. Tighten clamping screw if required. Under very unusual conditions it might become necessary to replace the resistor housing seal O-ring. Proceed as described in paragraph 2, Load Resistor.

Check coolant level by placing load on end with input connector up. As above, remove the load resistor assembly. When the unit is at ambient (room) temperature, the coolant level should be 4-3/4 inches (120 mm) below the top surface of the load resistor assembly mounting ring. The unit is factory-filled to this level with 2.9 gallons (11 liters) of specially selected dielectric fluid (Bird #5-1070-3). NO OTHER COOLANT MAY BE USED.

When the coolant oil is heated, thermal expansion would cause an increase in internal pressure. The breather plug installed on the topside of the radiator tank is provided to relieve this while protecting the opening from possible entry of dirt or other contamination.

4. RF Input Connector

The input connector on the Model 8890-300, only, is of a special Bird Quick-Change "QC" design which permits easy interchange of connectors with only simple tools. This process does not in any way disturb the coolant seal or interfere with the essential coaxial continuity of the Load Resistor input. Normally a Female LC connector is supplied with Model 8890-300. (Continued)

4. RF Input Connector (Continued)

It must be clearly understood that at the full power and frequency capability of this Model, see Summary Sheet, page -A-, only Type LC or LT (Female or Male) or 7/8" EIA (Air Line) connectors will be adequate. Even though connectors are easily changed, as described below, for any of the other connector types listed herein, input power values must be limited to the specified parameters of the selected type.

If replacement of the RF input connector becomes necessary, proceed as follows:-

(1) Remove the four #8-32 x 5/16" round head machine screws from the corners of the RF connector.

(2) Pull connector straight out.

(3) Reverse the preceding procedure to install new connector, making certain that the projecting center contact pin of the "QC" connector is carefully engaged and properly aligned with the mating socket of the Load Resistor.

The "QC" connector may be readily replaced, as above, with other AN Standard Type connectors if specially obtained from Bird Electronic Corporation. Suggest available "QC" connector types as follows:-

N-Fem	4240-062	LC-Fem	4240-031	C-Female	4240-100
N-Male	4240-063	LC-Male	4240-025	C-Male	4240-110
HN-Fem	4240-268	LT-Fem	4240-018	UHF-Fem	(SO-239) 4240-050
HN-Male	4240-278	LT-Male	4240-012	UHF-Male	(PL-259) 4240-179

7/8" EIA Air Line 4240-002

SECTION VI - REPLACEMENT PARTS LIST
Series 8890-300 Load Resistors

	ITEM	REQ.	DESCRIPTION	PART NO.
	1	1	RF Load Resistor - Model 8890-300	8890-050
or	1	(1)	" " " - " 8891-300	8891-050
"	1	(1)	" " " - " 8892-300	8892-015
"	1	(1)	" " " - " 8895-300	8895-015
"	1	(1)	" " " - " 8897-300	8897-003
	2	-1-	O-Ring, Resistor Housing Seal P/O Item 1, above	5-230
	3	1	Clamping Band Assy (2430-043 & Scr.)	2430-055
	4	1	O-Ring, Breather Seal	5-504
	5	1	Vent, Breather (In use - Replaces Item 7)	5-835
	6	1	O-Ring, Shipping Plug	5-502
	7	1	Plug, Shipping	2450-049
	8*	1	Thermoswitch Assy., Overtemp.	8890-008
	9*	-1-	Body, Thermoswitch (Item 8)	8890-005
	10*	-1-	Jack, Thermoswitch (Item 8)	2450-018
	11	-	Dielectric Liquid, 2.9 gal. (11 liter)	5-1070-3
	12	1	Radiator, Assy	2450-301

* Optional items.

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From 2 to 2300 MHz and from 25 milliwatts to 250 kilowatts in 50-ohm coaxial line systems.

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